ee at work where electric efficiency and efficient regulation meet.

n May, PJM Interconnection included energy efficiency (EE) as a resource in its forward capacity market auction (called the forward Reliability Pricing Model). With this development, PJM becomes the second independent system operator (after ISO New England) to give EE the same status as generators and demand response (DR) in the effort to meet future capacity needs.



By Lisa V. Wood, executive director of the Institute for Electric Efficien<u>cy.</u> sion. To manage the risk, ISOs must :

qualify proposed EE resources to ensure that claimed future savings are likely to be captured; and

 develop robust measurement and verification procedures to ensure that market-clearing EE indeed captures those savings.

The Take-Aways

Evidence suggests that EE already plays a strong role in meeting future wholesale market needs. In PJM's May FCM auction, 7,047 megawatts (MW) of DR and 569 MW of EE resources, for a total of 7,616 MW of demand-side resources, cleared the auction at prices ranging from \$16.46 to \$222.30 per megawattday (or \$0.50 to \$6.76 per KW-month), reflecting the impact of transmission constraints. Demand-side resources represent 5.6 percent of the 136,144 total MW that cleared for 2012-13, with EE representing 0.4 percent.

ISO New England now has two auctions involving EE under its belt. In its February 2008 auction, both new and existing demand- and supply-side providers competed to supply the 32,305 MW required in the 2010-11 timeframe. In the end, 34,352 MW of resources cleared the auction at the floor price of \$4.50 per KW-month—2,554 MW of that capacity were new and existing demand resources, about a quarter of which (655 MW) were EE. Demand resources represented about 7 percent of the total resources with 2 percent coming from efficiency resources.

ISO New England's second auction, held in December 2008, resulted in 2,937 MW of demand resources clearing the auction at the floor price of \$3.60 per KW-month. The 15-percent increase in demand-side resources was notable, with EE representing 890 MW—about 30 percent—of the total. While the amount of DR may begin to level out in future auctions, ISO New England expects that EE will continue to grow.

In the two New England auctions, while merchant providers dominated the real-time DR (about 81 percent and 83 percent, respectively) and the real-time emergency generation categories, utilities were responsible for the majority of EE that cleared the market (about 76 percent in the first auction and 82 percent in the second).

The inclusion of EE as a capacity resource heralds a new era for wholesale markets. "New investments in energy efficiency should help lower the cost of meeting the peak demand for power on hot summer days," said Steven Nadel, executive director of the American Council for an Energy-Efficient Economy in a recent press release. "The PJM auction will provide a new source of funding for efficiency projects, allowing the savings to consumers to grow." ◆



Both PJM and ISO New England's forward capacity markets (FCMs) were developed to encourage investment in power system resources by projecting the needs of the power system three years in advance and holding annual auctions to purchase an efficient mix of both supply-side and demandside resources to satisfy future capacity requirements.

As EE competes with traditional generation resources and DR in the FCM, EE is transitioning into a new role in the industry, going from a mandated target to a competitive resource and, as such, can attract more investment. "Efficiency is no longer just icing on the cake," says Henry Yoshimura, director of demand resource strategy at ISO New England. "As energy efficiency begins displacing some generation, we'll be relying more on these resources to help maintain the reliability of



the power system."

The Challenges

In wholesale markets, managing EE can be complicated, says Yoshimura, because it is a "passive" resource. With "active" generation resources, accounting for what providers deliver is comparatively straightforward—the operator can dispatch a power plant with

the capacity to generate a given number of megawatts (MW). Acquiring demand-side resources, such as DR to reduce peak loads, is still relatively new to ISOs, but DR is similar to generation as a capacity resource, in that the operator can dispatch it to address real-time system conditions. But EE, designed to save energy, is not dispatchable, per se—EE resources have already reduced the real-time load and can't be "dispatched" to reduce any more.

But EE resources result in reductions in end-use electricity consumption that are verifiable. Treating these resources (sometimes referred to as "negawatts") like standard capacity requires increased interaction between load forecasts and resource plans. "We're looking for resources that are not included in the demand forecast," says Murty Bhavaraju, PJM's senior consultant for forward market operations, "not projects that were completed and reflected in the demand forecast used for auctions."

The lack of real-time control makes reliance on EE a different type of risk. For EE resources to function as future capacity, they must permanently reduce the demand that the ISO includes in its load forecast and must be verified with preci-

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